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December 15, 1999

UTILITY PATENT APPLICATION TRANSMITTAL LETTER

Assistant Commissioner of Patents
Box **Patent Application**
Washington, D.C. 20231

Sir:

Enclosed herewith for filing is the following
utility patent application:

Attorney Docket No.: OOCL-7(6SY-99S0780-1)

Applicants: Sumito HONDA, Tsuyoshi YAJI, Yuji IMAI

Title: "DISPLAY DEVICE FOR CAMERA USING ORGANIC EL ELEMENT"

PATENT APPLICATION FILING FEE CALCULATION

	<u>No. Filed</u>	<u>Less</u>	<u>Rate/Claim</u>	<u>Fee</u>
Total				
Claims	<u>22</u>	-20	2 x \$18.00	<u>\$ 36.00</u>
Independent				
Claims	<u>7</u>	-3	4 x \$78.00	<u>\$ 312.00</u>
			Minimum Filing Fee	<u>\$ 760.00</u>
			Multiple Dependency Fee	
			(if applicable - \$260.00)	<u>\$ 00.00</u>
			50% Reduction for Small Entity	
			(Independent Inventor, Non-profit	
			Corporation, or Small Business	
			Concern) - appropriate	
			verified statement attached	<u>\$- 00.00</u>
			TOTAL FILING FEE	<u>\$1,108.00</u>
			ASSIGNMENT RECORDATION	<u>\$ 40.00</u>
			TOTAL FEES ENCLOSED	<u>\$1,148.00</u>

☒ Specification: 30 Total Pages (including claims and abstract)

☒ Drawing(s): 11 Total Sheets (FIGs. 1-15)

Also enclosed herewith for filing in connection with the enclosed application are:

☒ A check in the amount of \$ 1,148.00 (the total filing fee) is enclosed. In the event this check is missing or insufficient, kindly charge the entire or additional filing fee, as appropriate, to the deposit account of STRAUB & POKOTYLO, deposit account number 50-1049. To facilitate that charge, a duplicate copy of this letter is enclosed herewith.

☒ Return Postcard Receipt (1);

☐ Preliminary Amendment;

☒ Oath or Declaration (4 pages):

☒ Newly executed on December 8 and 9, 1999

☐ Copy from a prior application (36 C.F.R. § 1.63(d);

☐ Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b);

☒ Assignment Papers (2 pages) to: Olympus Optical Co., Ltd.;

☒ Assignment Recordation form cover sheet (in duplicate);

☒ Information Disclosure Statement, modified PTO-1449, and cited reference (AA.);

☐ Letter referencing previously filed disclosure document; number _____ filed _____;

☐ Verified Statement Claiming Small Entity Status:

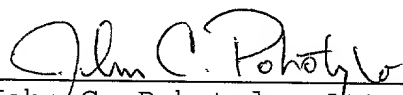
☐ Newly executed on _____;

☐ Copy from a prior application, status still proper and desired;

- ☐ Microfiche Computer Program (Appendix);
- ☐ English translation document;
- ☒ Submission of Priority Document and a certified copy of a Japanese patent application or inventor's certificate, filed December 16, 1998 and assigned serial no. 10-357641, upon which a claim to priority is made; and
- ☐ Other: _____

Respectfully submitted,

STRAUB & POKOTYLO


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EXPRESS MAIL CERTIFICATION

"Express Mail" mailing label number: EL404084863US
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Signature of person making certification

John C. Pokotylo
Name of person making certification

TITLE OF THE INVENTION

DISPLAY DEVICE FOR CAMERA USING ORGANIC EL ELEMENT

BACKGROUND OF THE INVENTION

5 The present invention relates to a display device
for a camera using an organic electroluminescent
element (herein, referred to as organic EL element)
which can emit multiple color lights or polychromatic
lights.

10 Nowadays, as improvement in function and multi-
function of a camera is advanced, it becomes necessary
to display much information on a display section of the
camera. Simultaneously therewith, there is a tendency
that downsizing of a camera is promoted and thereby the
size of the display section is limited so that
15 individual display segments in the display section are
made small. Under these conditions, various technical
developments have been made in order to realize display
obvious or easy to understand for a photographer of a
camera.

20 Herein, in Jpn. Pat. Appln. KOKAI Publication
No. 8-82841, for example, there has been disclosed a
technique regarding a display device for a camera where
a display is made easy to understand by changing colors
of back light of a display section or display segments.
25 That is, the technique is characterized in that a
control circuit controls the contents of display of a
display device comprising a liquid crystal display

panel and controls respective colors which are
generated by back light means comprising red, blue and
green LEDs according to output signals from a back
light driver to change the back light color of the
5 display device for display, so that various displays
can easily be distinguished or identified from one
another.

In the above conventional art, however, there
occur the following problems.

10 Namely, there is a problem that a display on the
display section becomes difficult to understand for a
photographer when a photograph is taken in a room
illuminated with the same color as the color of the
display section. Furthermore, there also occurs a
15 problem that, since colors on the display section
regarding the display corresponding to respective
operation modes of the camera are preliminarily
determined, an image of a photographer to each
operation mode does not correspond to the actual color
20 on the display section in each operation mode, so that
the photographer feels incompatibility.

BRIEF SUMMARY OF THE INVENTION

In view of the above, an object of the present
invention is to provide a display device for a camera
25 which allows display ease to understand or obvious for
a photographer without giving an incompatible feeling
to the photographer.

In order to achieve the above object, a display device for a camera according to a first aspect of the invention comprises:

an organic electroluminescent element for emitting
5 multiple color lights;

driving condition setting means for changing driving conditions for driving the organic electroluminescent element; and

driving control means for driving the organic
10 electroluminescent element on the basis of the driving conditions set by the driving condition setting means.

A display device for a camera according to a second aspect of the invention comprises:

an organic electroluminescent element for emitting
15 multiple color lights;

driving condition setting means for changing driving conditions for driving the organic electroluminescent element;

storing means for storing the driving conditions
20 set by the driving condition setting means; and

driving control means for driving the organic electroluminescent element on the basis of the driving conditions stored in the storing means.

A camera according to a third aspect of the
25 invention comprises:

an organic electroluminescent element for emitting multiple color lights;

driving condition setting means for changing driving conditions for driving the organic electroluminescent element; and

5 a display device for displaying that setting the driving conditions by the driving condition setting means is enable or allowable.

Also, a display device for a camera according to a fourth aspect of the invention comprises:

10 an organic electroluminescent element emitting multiple color lights;

a driving condition setting circuit setting data corresponding to driving conditions of the organic electroluminescent element; and

15 a display device displaying that setting the driving conditions by the driving condition setting circuit is allowed.

A display device for a camera according to a fifth aspect of the invention comprises:

20 a display section including an organic EL element for emitting multiple color lights;

a first driving condition setting section for setting luminous brightness of the organic EL element;

a second driving condition setting section for setting luminous color of the organic EL element; and

25 a driving control section driving the organic EL element on the basis of the driving conditions set by the first driving condition setting section and the

second driving condition setting section.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the invention, and together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

FIG. 1 is a block diagram showing a configuration of a camera adopting a display device for a camera according to a first embodiment of the present invention;

FIG. 2 is a perspective appearance view of the camera according to the first embodiment;

FIG. 3 is a view showing all segments displayed on a LCD section 14 for an external display;

FIG. 4 is a flowchart for explaining an operation sequence effected by the camera according to the first embodiment;

FIG. 5 is a flowchart showing for explaining a detailed operation of a subroutine [setting of photographing mode] performed at Step S10 in FIG. 4;

5 FIG. 6 is a flowchart for explaining an operation of a subroutine [setting of EL driving conditions] performed at Step S11 in FIG. 4;

FIG. 7 is a view showing an aspect where a photographing date and hour displaying section is displayed in an EL setting mode;

10 FIG. 8 is a flowchart for explaining an operation of a subroutine [brightness setting] performed at Step S103 in FIG. 6;

15 FIG. 9 is a flowchart for explaining an operation of a subroutine [color setting] performed at Step S104 in FIG. 6;

FIG. 10A is a view showing one example of a structure of an organic EL element emitting two color lights, and FIG. 10B is a diagram showing waveforms of a light-emitting control signal;

20 FIG. 11 is a flowchart for explaining an operation sequence of a camera according to a second embodiment in detail;

FIG. 12 is a flowchart showing a sequence for setting luminous brightness in a case where mode is switched in the order of [photographing mode] → [EL brightness setting mode] → [EL luminous color setting mode] by a mode selector switch 5;

25

FIG. 13 is a flowchart showing a sequence for setting luminous color in a case where mode is switched in the order of [photographing mode] → [EL brightness setting mode] → [EL luminous color setting mode] by the mode selector switch 5;

FIG. 14 is a view showing a laminated or stacked structure of an organic EL element which can emit three color lights independently from one another; and

FIG. 15 is a diagram showing driving waveforms obtained when 6 kinds of lights are to be emitted by using the organic EL element shown in FIG. 14 to combine emissions of three colors.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the present invention will be explained with reference to the drawings.

FIG. 1 is a block diagram showing a configuration of a camera adopting a display device for a camera according to a first embodiment of the invention.

In FIG. 1, a central processing unit (CPU; Central Processing Unit) 1 controls various operations of a camera and it includes a timer section 2 for counting predetermined times therein.

Connected to the CPU 1 are a power switch 3, a release switch 4, a mode selector switch 5 for performing switching between a photographing mode and an EL setting mode, a strobe switch 6 for switching photographing modes at a time of the photographing mode

(also serving as an EL brightness adjusting switch for adjusting a brightness of an organic EL element at a time of an EL setting mode), and a self-mode switch 7 for switching self-mode at a time of the photographing mode (also serving as an EL luminous color changing switch for changing luminous colors at a time of the EL mode setting mode).

The release switch 3 is constituted such that the 1st release (1R) is turned on when a release button is half pressed and the 2nd release (2R) is turned on when the release button is fully pressed.

Also, connected to the CPU 1 are a strobe section 11 which is controlled by the CPU 1 on the basis of the measured results obtained by an AE section 8, if necessary, and a lens focusing section 10 which is focus-controlled by the CPU 1 on the measured results obtained by an AF section 9. Furthermore, an organic EL element 17 for back light and a LCD section 14 for outside display are respectively connected to the CPU 1 through a driver circuit section 15 and a liquid crystal control section 13.

Next, FIG. 2 is a perspective appearance view of the camera according to the first embodiment.

As shown in FIG. 2, a finder 19 is provided at a back of a camera body 18, and the LCD section 14 for outside display is disposed at a central section of an upper face of the camera body 18. Also, the release

switch 4 and the power switch 3 are arranged at both sides on the upper face of the camera body 18.

Furthermore, the mode selector switch 5, and the strobe switch (EL brightness adjusting switch) 6 and the self-mode switch (EL luminous color changing switch) 7 are respectively disposed adjacent to both sides of the LCD section 14 for outside display.

Next, all segments displayed on the above LCD section 14 for outside display will be explained with reference to FIG. 3. A battery check mark 30, a photographing date and hour 31, a strobe light-emitting (light-emitting prohibition) mode mark 32, full auto-mode mark 33, slow mode mark 34, a film loading/winding/rewinding mark 35, a red-eye reducing mode mark 36, a scene mode mark 37, a self-timer mode mark 38, and a film frame number 39 are displayed on the LCD section 14 for outside display. An organic EL element 17 for back light (corresponding to a region shown in a broken line in FIG. 3) is disposed below these display segments.

An operation sequence of the camera according to the first embodiment will be explained below with reference to a flowchart shown in FIG. 4.

When the camera is actuated by turning on the power switch 3, the CPU 1 first initializes respective sections of the camera (Step S1). Next, the CPU 1 reads information about the camera such as the number

of frames, a photographing mode, and the like from
EEPROM 16 (Step S2), and it performs display on the LCD
section 14 on the basis of the information read out
(Step S3). Furthermore, the CPU 1 causes the organic
5 EL element 17 for back light to emit on the basis of
the information read out in Step S2 (Step S4).

Next, the CPU 1 confirms a state of the power
switch 3 (Step S5), and the CPU 1 terminates processing
to stop operation of the camera, when the power switch
10 3 is off. On the contrary, when the power switch 3 is
on, the CPU 1 determines whether or not the mode
selector switch 5 is turned on (Step S6), and the
control routine proceeds to Step 10 when the mode
selector switch 5 is off.

15 On the other hand, in Step S6, when the mode
selector switch 5 is turned on, the CPU 1 determines
whether the current mode is the photographing mode or
the EL setting mode (Step S7). When the current mode
is the photographing mode, the CPU 1 changes the
20 current mode to the EL setting mode (Step S8), and when
the current mode is the EL setting mode, it changes the
current mode to the photographing mode (Step S9).

Sequentially, the CPU 1 performs a subroutine
[photographing mode setting] described in detail below
25 (Step S10), and further performs a subroutine [EL
driving condition setting] described in detail below to
set the luminous brightness and luminous color of the

organic EL element 17 for back light (Step S11).

5 Sequentially, the CPU 1 determines whether or not the 1R (the 1st release) of the release switch 4 is on (Step S12), and when the release switch 4 is not turned on, the control routine returns to the Step S3 again to wait until the 1st release is turned on. On the other hand, when the 1R of the release switch 4 is turned on, the CPU 1 performs photometry and range finding with the AE section 8 and the AF section 9 (Step S13).

10 Next, the CPU 1 determines whether or not the 1R of the release switch 4 is on again (Step S14). When the 1R is not on, the control routine returns to the Step S3 and, when it is on, the CPU 1 determines whether or not the 2R (2nd release) of the release
15 switch 4 is on (Step S15). When the 2R is not on, the control routine returns to the Step S14, and when it is turned on, a predetermined photographing action or operation is performed (Step S16). Thus, when the photographing action is completed, the control routine
20 returns to the Step S3 and waits until a switch is input or turned on again.

 Next, detailed operation of a subroutine [photographing mode setting] executed in Step 10 in FIG. 4 will be explained with reference to a flowchart
25 of FIG. 5.

 First, the CPU 1 determines whether or not the current mode is the photographing mode (Step S21).

Here, when the current mode is not the photographing mode, this subroutine is terminated and the control routine returns to processings of Step S11 on of FIG. 4. On the contrary, when the current mode
5 is the photographing mode, the CPU 1 determines whether or not the self-mode switch 7 is on (Step S22). Here, when the self-mode switch 7 is off, the control routine proceeds to Step S26, and when it is on, the CPU 1 determines whether or not the current mode is the self-
10 mode (Step S23).

When the current mode is the self-mode in the Step S23, the CPU 1 clears the self-mode (Step S24), and when it is not the self-mode, the CPU 1 sets the current mode to the self-mode (Step S25) and it
15 determines whether or not the strobe switch 6 is on (Step S26). Here, when the strobe switch 6 is off, the processing of this subroutine is terminated.

When the strobe switch 6 is on in the Step S26, the CPU 1 determines whether or not the current mode is a light-emitting inhibition mode (Step S27). Here,
20 when the current mode is the light-emitting inhibition mode, the CPU 1 sets the current mode to a compulsory or forced light-emitting mode (Step S28) to terminate this subroutine. On the other hand, when the mode is
25 the light-emitting inhibition mode, the CPU 1 determines whether the mode is not the forced light-emitting mode (Step S29). Here, when the mode is the

forced light-emitting mode, the CPU 1 set the mode to a scene mode (Step S30) to terminate this subroutine.

In the Step S29, when the current mode is not the forced light-emitting mode, the CPU 1 determines
5 whether or not the current mode is the scene mode (Step S31). When the current mode is the scene mode, the CPU 1 sets the mode to a slow mode (Step S32) to terminate this subroutine. In the Step S31, when the current mode is not the scene mode, the CPU 1 determines
10 whether or not the current mode is the slow mode (Step S33). When the mode is the slow mode, the CPU 1 sets the mode to a red eye-reducing mode (Step S34) to terminate this routine. In the Step S33, when the mode is not the slow mode, the CPU 1 determines whether or
15 not the mode is the red eye reducing mode (Step S35). When the mode is the red-eye reducing mode, the CPU 1 sets the mode to a full auto-mode (Step S36) to terminate this subroutine. In the Step S35, when the mode is not the red-eye reducing mode, the CPU 1
20 determines whether or not the mode is the full auto-mode (Step S37). When the current mode is the full auto-mode, the CPU 1 set the mode to the light-emitting inhibition mode (Step S38) to terminate this subroutine. In the Step S37, when the mode is not the full auto-
25 mode, the CPU 1 holds this mode to terminate this subroutine.

Next, operation of the subroutine [EL driving

condition setting] executed in the Step S11 of FIG. 4 will be explained with reference to a flowchart of FIG. 6.

5 First, the CPU 1 determines whether or not the current mode is an EL setting mode (Step S101). Here, when the mode is not the EL setting mode, the CPU 1 terminates this subroutine. On the other hand, when the mode is the EL setting mode, the CPU 1 displays an EL setting mode on the photographing date and hour
10 display section of the LCD section 14 for outside display (refer to FIG. 7) in order to inform a photographer that the EL setting mode has been set (Step S102).

15 Then, the CPU 1 executes a subroutine [brightness setting] described in detail later, where brightness setting processing is performed such that a photographer can set luminous brightness of the organic EL element 17 (Step S103), and the CPU 1 executes a subroutine [color setting] described in detail later,
20 where color setting processing is performed such that a photographer can set luminous color of the organic EL element 17 (Step S104). Next, after the above respective setting processings, the CPU 1 determines whether or not the setting change has been performed
25 (Step S105). When the CPU 1 determines that the setting change has been performed, it writes changed data in the EEPROM 16 (Step S106). Next, when it is

determined in the Step 105 that the setting change has not been performed, the control routine proceeds to Step S107, where the driver circuit 15 of the organic EL element 17 for back light is driven under the set
5 conditions, and the control routine returns to the processings of Step S12 and on of the FIG. 4.

Next, operation of the subroutine [brightness setting] executed in the Step S103 of FIG. 6 will be explained with reference to a flowchart of FIG. 8.

10 In this subroutine, when a photographer selects the EL setting mode with the mode selector switch 5, the strobe switch 6 and the self-mode switch 7 are respectively switched to the EL brightness adjusting switch 6 and the EL luminous color changing switch 7
15 functionally.

That is, the CPU 1 checks whether or not the EL brightness adjusting switch 6 has been input or turned on (Step S201), and it terminates the processing when the switch 6 has not been input. On the other hand,
20 when the switch 6 has been input, the CPU 1 counts up a count value NB representing a luminous brightness adjusting level by +1 (Step S202). Sequentially, the CPU 1 checks whether or not the NB is larger than the maximum value NBX in a luminous brightness adjustable
25 range (Step S203), and the NB is reset to [0] which is the minimum value in the luminous brightness adjustable range again when the former is larger than the latter

(Step S204). In the above Step S203, when the NB is less than the NBX or after the processing in the Step S204 is performed, the CPU 1 terminates this processing.

Here, for example, the NB takes a value for each
5 count form 0 (OFF) up to 5 (=NBX) and the CPU 1
confirms this each count value to control the driver
circuit 15 so as to change bias voltage (Vb) described
later in FIG. 10B according to the value, thereby
changing the luminous brightness of the organic EL
10 element 17 for back light.

Next, the subroutine [color setting] executed in
the Step S104 of FIG. 6 will be explained with
reference to a flowchart of FIG. 9.

First, the CPU 1 checks whether the EL luminous
15 brightness changing switch 7 has been input or turned
on (Step S301) to terminate the processing when not.

On the other hand, when the EL luminous color
changing switch 7 has been input or turned on, the CPU
1 counts up the count value NC representing the
20 luminous color adjusting level by +1 (Step S302).
Sequentially, the CPU 1 checks whether or not the NC is
larger than the maximum value NCX which is adjustable
in a luminous color adjustable range (Step S303), and
it resets [0] which is the minimum value in the
25 luminous color adjustable range again when larger (Step
S304). In the Step S303, when the NC is the NCX or
less or after the processing in the Step S304 is

terminated, the CPU 1 terminates this processing.

Here, for example, the NC takes the values 0 to 2, and the CPU 1 confirms the count value such that 0 becomes green color, 1 becomes red color and 2 becomes yellow color to control the driver circuit 15 so as to output waveforms such as shown in FIG. 10B described later according to the count value, thereby changing the luminous color of the organic EL element 17 for back light.

Here, FIG. 10A shows one example of a structure of an organic EL element emitting two color lights. As shown in FIG. 10A, an element structure has a structure where luminous layer section is sandwiched between an anode and a cathode on a glass substrate 50. The anode is constituted with a transparent electrode 51 and the cathode is constituted with a metal electrode 55. The luminous layer section has a three-layered structure of a green color luminous layer 54 made of material emitting green color light at a forward bias time, a red color luminous layer 52 made of material emitting red color light at a reverse bias time and a carrier blocking layer 53.

In such a structure, as shown in FIG. 10B, in a case of green color light emission, +Vb (about 5V) and 0V are respectively applied to the anode and the cathode. In a case of red color light emission, 0V and +Vb are respectively applied to the anode and the

cathode. In a case of yellow light emission, forward bias and reverse bias are alternately driven at a frequency of about 200 Hz in a time dividing manner to produce color light mixture in order to prevent flickering to eyes.

As mentioned above, according to the first embodiment, a photographer operates the mode selector switch 5 to select the EL setting mode and turn on the EL brightness adjusting switch 6 according to a photographing environment or his/her taste so that the luminous brightness of the organic EL element 17 for back light can be changed, and the EL luminous color changing switch 7 is turned on so that the luminous color of the organic EL element 17 for back light can be changed. Also, since the setting conditions are stored in the EEPROM 16, even when the power supply is interrupted once, it is unnecessary to set the conditions again and the luminous brightness and the luminous color which have been set previously can be regenerated or reproduced.

Next, a second embodiment of the present invention will be explained in detail.

Incidentally, a configuration of a camera adopting a display device for a camera according to the second embodiment is similar to that explained in FIG. 1, and detailed explanation thereof is omitted. Same members in this embodiment are explained with same reference

numerals as those in FIG. 1.

Operation sequence of the camera according to the second embodiment will be explained in detail with a flowchart of FIG. 11.

5 Incidentally, since processings are similar to those in FIG. 4 except for the processing performed when the mode switch 5 is turned on in the Step S606, only different steps will be explained.

10 In Step S606, when the mode switch 5 is turned on, the CPU 1 determines whether the current mode is the photographing mode (Step S607). Here, in the case of the photographing mode, the CPU 1 performs mode change to the EL brightness setting mode (Step S608).

15 When it is determined in the Step S607 that the current mode is not the photographing mode, the CPU 1 determines whether or not the current mode is the EL brightness setting mode (Step S609). Here, in the case of the EL brightness setting mode, the CPU 1 performs mode change to the EL luminous color setting mode (Step
20 S610). When it is determined in the Step S609 that the current mode is not the EL brightness setting mode, the CPU 1 performs setting to the photographing mode (Step S611).

25 FIG. 12 is a flowchart showing a sequence for performing luminous brightness setting in a case where the mode is switched in the order of [photographing mode] → [EL brightness setting mode] → [EL luminous

color setting mode].

First, the CPU 1 checks whether or not the EL brightness setting mode has been selected by the mode selector switch 5 (Step S401), and it terminates the processing when the mode is not the EL brightness setting mode. In the Step S401, when the EL brightness setting mode has been selected, the CPU 1 checks whether or not an up switch (which is another function of as the strobe switch 6) which is adjustable in a brighter direction has been input or turned on (Step S402), and it counts or increments the count value NB by +1 (Step S403).

As a result, the CPU 1 checks whether or not the NB exceeds the maximum value BX (Step S404). When the NB exceeds the maximum value BX, the CPU 1 replaces the NB with the BX to fix the NB to the maximum value and terminate the processing. When the former does not exceed the latter, the CPU 1 holds the set value to terminate the processing (Step S407).

On the other hand, in the Step S402, when the up switch is not input or turned on, the CPU 1 checks whether or not a down switch (which is another function of the self-mode switch 7) which is adjustable in a darker direction has been input or turned on (Step S405).

Here, when the input has not been performed, the CPU 1 terminates the processing and when the input has

been performed, the CPU 1 counts the count value NB by
-1 (Step S406). Then, the CPU 1 checks whether or not
NB has become less than 0 (Step S408). When NB has
become less than 0, the CPU 1 replaces NB with 0 to fix
5 NB to the minimum value and terminate the processing.
Otherwise, the CPU 1 holds the set value to terminate
the processing (Step S409).

Here, FIG. 14 is a view showing a laminated or
stacked structure of an organic EL element which can
10 emit three color lights independently. In order to
emit respective color lights from the respective
laminated layers, the organic EL element is structured
such that bias voltages are individually applicable to
respective layers. Furthermore, FIG. 15 is an example
15 of driving waveforms obtained when the organic EL
element in FIG. 14 is used to emit 6 kinds of lights by
combining light emissions of three colors.

Next, a sequence for performing luminous color
setting in a case where mode switching is performed in
20 the order of [photographing mode] → [EL brightness
setting mode] → [EL luminous color setting mode] will
be explained with reference to a flowchart of FIG. 13.

First, the CPU 1 checks whether or not the EL
luminous color setting mode has been selected by the
25 mode selector switch 5 (Step S501). When the EL
luminous color setting mode has not selected, the CPU 1
terminates the processing. When the EL luminous color

setting mode has been selected, the CPU 1 checks whether or not the up switch adjustable in a direction of a red color which is a warm color system has been input (Step S502). When the input has been performed, the CPU 1 counts the count value NC by +1 (Step S503). As a result, the CPU 1 checks whether or not NC exceeds the maximum value CX (Step S504). When NC exceeds the value, the CPU 1 replaces NC with CX to fix NC to the maximum value (Step S507) and terminates the processing. Otherwise, the CPU 1 holds the set value to terminate the processing.

On the other hand, in the Step S502, when the up switch has not been input, the CPU 1 checks whether or not a down switch adjustable in a direction of a cold color system has been input (Step S505). When the input has not been performed, the CPU 1 terminates the processing, and when the input has been performed, the CPU 1 counts the count value NC by -1 (Step S506). Then, the CPU 1 checks whether or not NC has become less than 0 (Step S508). When NC has become less than 0, the CPU 1 replaces NC with 0 to fix NC to the minimum value (Step S509) and terminate the processing. Otherwise, the CPU 1 holds the set value to terminate the processing.

As stated above, in the second embodiment, since the switch for count-up only performs count-up operation and the switch for count-down only performs

count-down operation, even in a case where setting levels are further finely divided, a photographer can grasp an image of the set level easily.

Also, in the second embodiment, though the organic EL element 17 is used for back light in the LCD section 14 for outside display, it is also possible to use the organic EL element 17 directly as a display segment, use it as a display in a finder, and use it on a section of a camera exterior as an accessory on a design.

As mentioned above, according to the present invention, a display device for a camera can be provided which does not give a feeling of incompatibility to a photographer, or which is easy to understand for a photographer, as he/she can set driving conditions according to a photographing environment or his/her taste.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

WHAT IS CLAIMED IS:

1. A display device for a camera comprising:
an organic electroluminescent element for emitting
multiple color lights;

5 driving condition setting means for changing
driving conditions for driving the organic electro-
luminescent element; and

driving control means for driving the organic
electroluminescent element on the basis of the driving
10 conditions set by the driving condition setting means.

2. The display device for a camera according to
claim 1, wherein the driving condition setting means
sets luminous brightness.

3. The display device for a camera according to
15 claim 1, wherein the driving condition setting means
sets luminous color.

4. The display device for a camera according to
claim 1, wherein the driving condition setting means
includes an operation member operated manually, and the
20 operation member also serves as another operation
member for setting a photographing mode of a camera.

5. The display device for a camera according to
claim 1, further comprising a mode selector member for
performing switching between a setting mode for setting
25 the driving conditions of the driving condition setting
means and a photographing mode of a camera,

wherein, when the setting mode is set by the mode

selector member, change in the driving conditions is allowed.

6. A display device for a camera comprising:
an organic electroluminescent element for emitting
5 multiple color lights;

driving condition setting means for changing
driving conditions for driving the organic electro-
luminescent element;

10 storing means for storing the driving conditions
set by the driving conditions setting means; and

driving control means for driving the organic
electroluminescent element on the basis of the driving
conditions stored in the storing means.

7. The display device for a camera according to
15 claim 6, wherein the storing means is an electrically
rewritable non-volatile memory.

8. The display device for a camera according to
claim 6, wherein the driving condition setting means
includes an operation member operated manually, and the
20 operation member also serves as another operation
member for setting a photographing mode of a camera.

9. The display device for a camera according to
claim 6, further comprising a mode selector member for
performing switching between a setting mode for setting
25 the driving conditions of the driving condition setting
means and a photographing mode of a camera,

wherein, when the setting mode is set by the mode

selector member, change in the driving conditions is allowed.

10. A camera comprising:

an organic electroluminescent element for emitting
5 multiple color lights;

driving condition setting means for changing
driving conditions for driving the organic electro-
luminescent element; and

a display device for displaying that setting the
10 driving conditions by the driving condition setting
means is allowable.

11. A display device for a camera comprising:

an organic electroluminescent element emitting
multiple color lights;

15 a driving condition setting circuit setting data
corresponding to driving conditions of the organic
electroluminescent element; and

a drive circuit driving the organic electro-
luminescent element on the basis of the driving
20 conditions set the driving condition setting circuit.

12. The display device for a camera according to
claim 11, wherein the driving condition setting circuit
sets luminous brightness.

13. The display device for a camera according to
25 claim 11, wherein the driving condition setting circuit
sets luminous color.

14. The display device for a camera according to

claim 11, wherein the driving condition setting circuit includes a switch circuit operated manually, and the switch circuit also serves as another switch circuit for setting a photographing mode of a camera.

5 15. The display device for a camera according to claim 11, further comprising a mode selector member for performing switching between a setting mode for setting the driving conditions of the driving condition setting circuit and a photographing mode of a camera,

10 wherein, when the setting mode is set by the mode selector member, change in the driving conditions is allowed.

 16. A display device for a camera comprising:
 an organic electroluminescent element emitting
15 multiple color lights;

 a driving condition setting circuit setting data corresponding to driving conditions of the organic electroluminescent element;

 a memory storing the driving conditions set by the
20 driving condition setting circuit; and

 a driving circuit driving the organic electroluminescent element on the basis of the driving conditions stored in the memory.

 17. The display device for a camera according to
25 claim 16, wherein the memory is an electrically rewritable non-volatile memory.

 18. The display device for a camera according to

claim 16, wherein the driving condition setting circuit includes a switch circuit operated manually, and the switch circuit also serves as another switch circuit for setting a photographing mode of a camera.

5 19. The display device for a camera according to claim 16, further comprising a mode selector switch for performing switching between a setting mode for setting the driving conditions of the driving condition setting circuit and a photographing mode of a camera,

10 wherein, when the setting mode is set by the mode selector member, change in the driving conditions is allowable.

 20. A camera comprising:

15 an organic electroluminescent element emitting multiple color lights;

 a driving condition setting circuit setting data corresponding to driving conditions of the organic electroluminescent element; and

20 a display device displaying that setting the driving conditions by the driving condition setting circuit is allowable.

 21. A display device for a camera comprising:

 a display section including an organic EL element for emitting multiple color lights;

25 a first driving condition setting section for setting luminous brightness of the organic EL element;

 a second driving condition setting section for

setting luminous color of the organic EL element; and

a driving control section driving the organic EL element on the basis of the driving conditions set by the first driving condition setting section and the
5 second driving condition setting section.

22. The display device for a camera according to claim 21, wherein the display section includes an outside display section.

5

A display device or a camera includes an organic electroluminescent element emitting multiple color lights. A driving condition setting circuit sets data corresponding to driving conditions for driving the organic electroluminescent element. A drive circuit drives the organic electroluminescent element on the basis of the driving conditions set by the driving condition setting circuit.

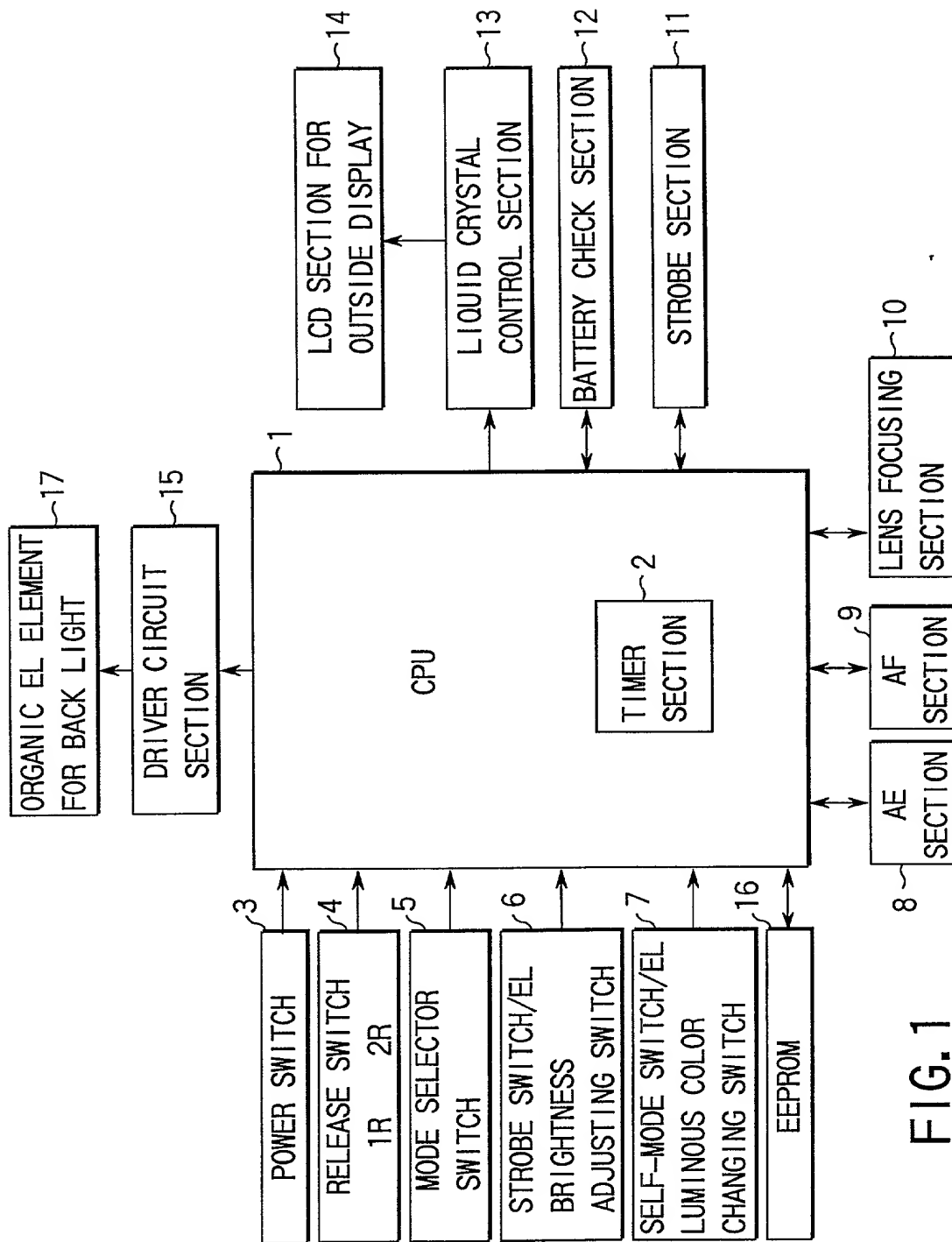


FIG. 1

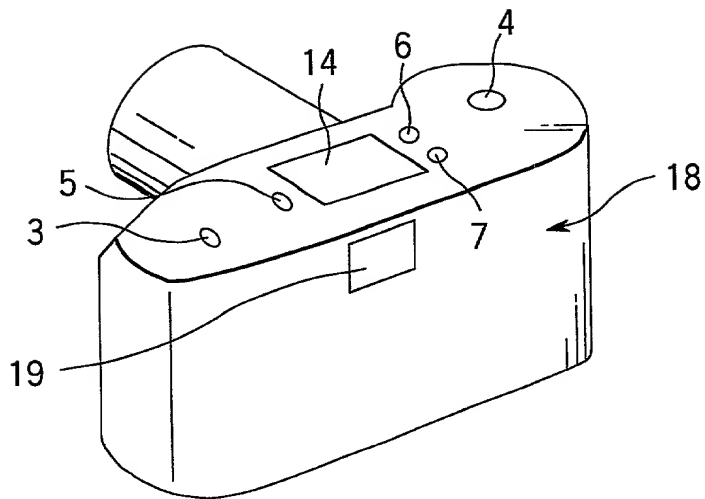


FIG. 2

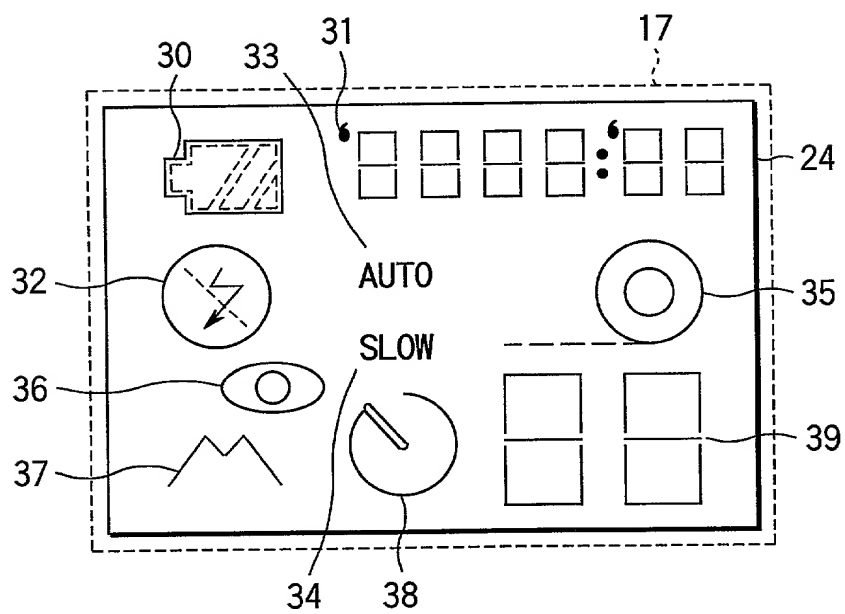


FIG. 3

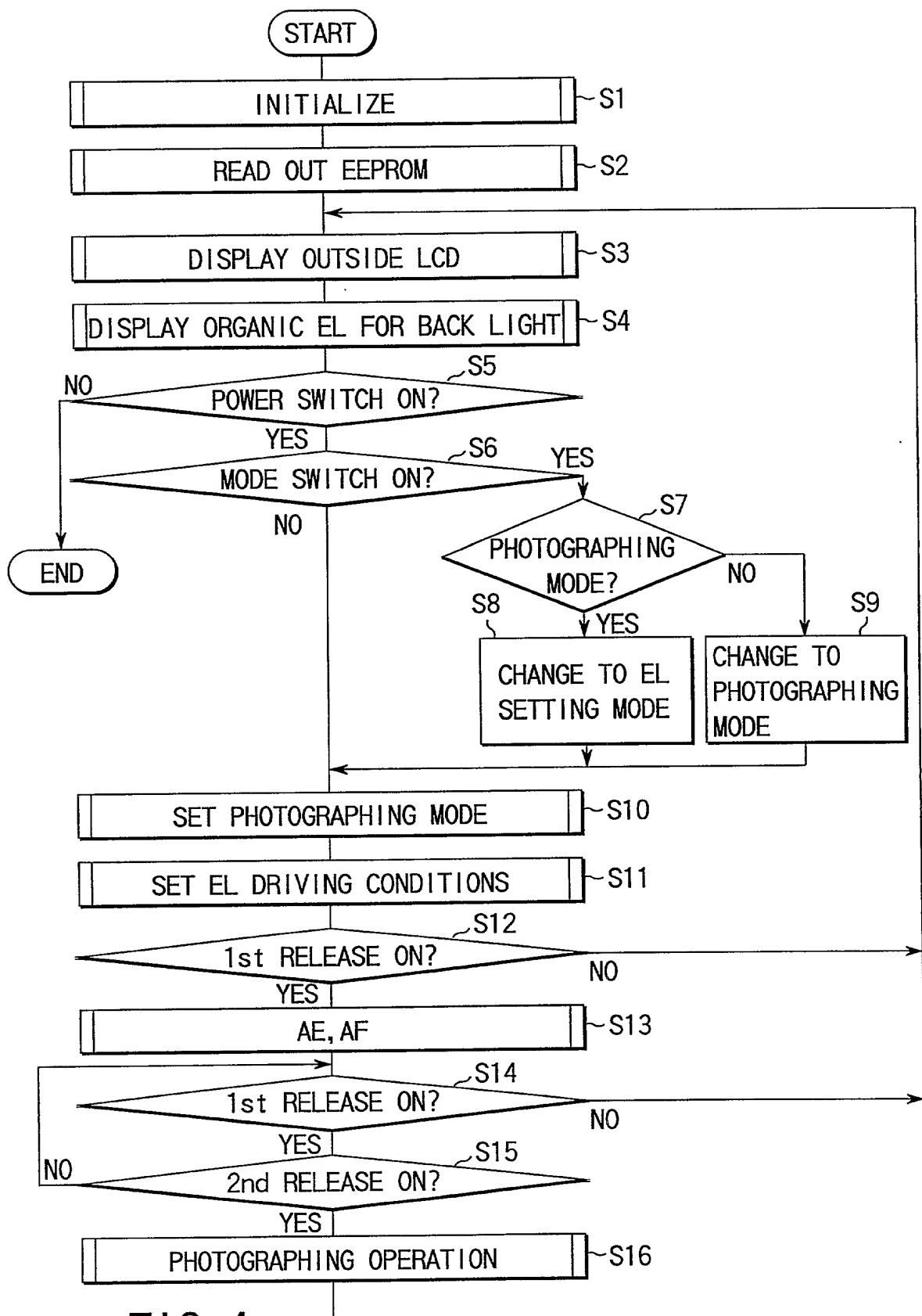


FIG. 4

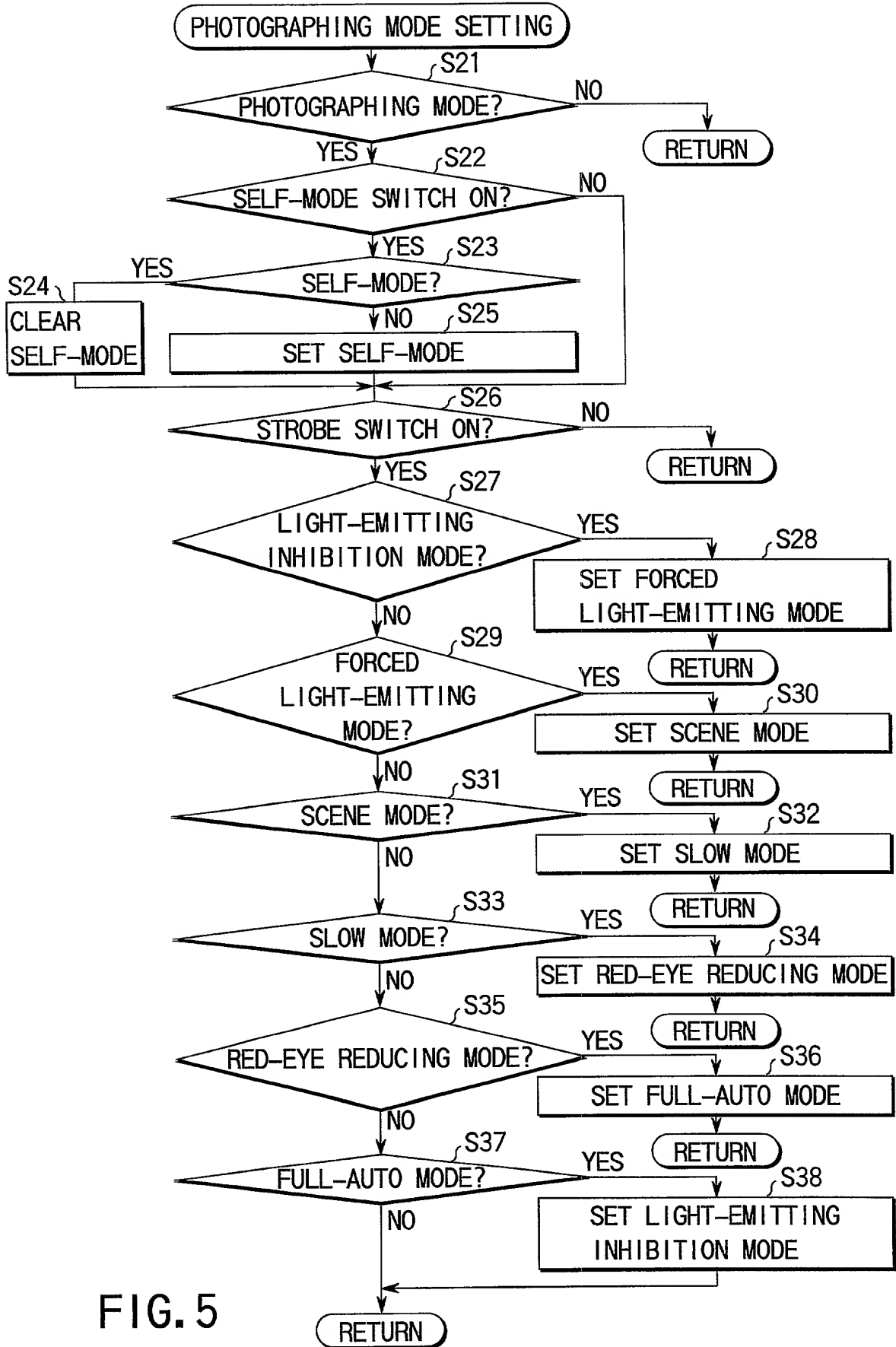


FIG. 5

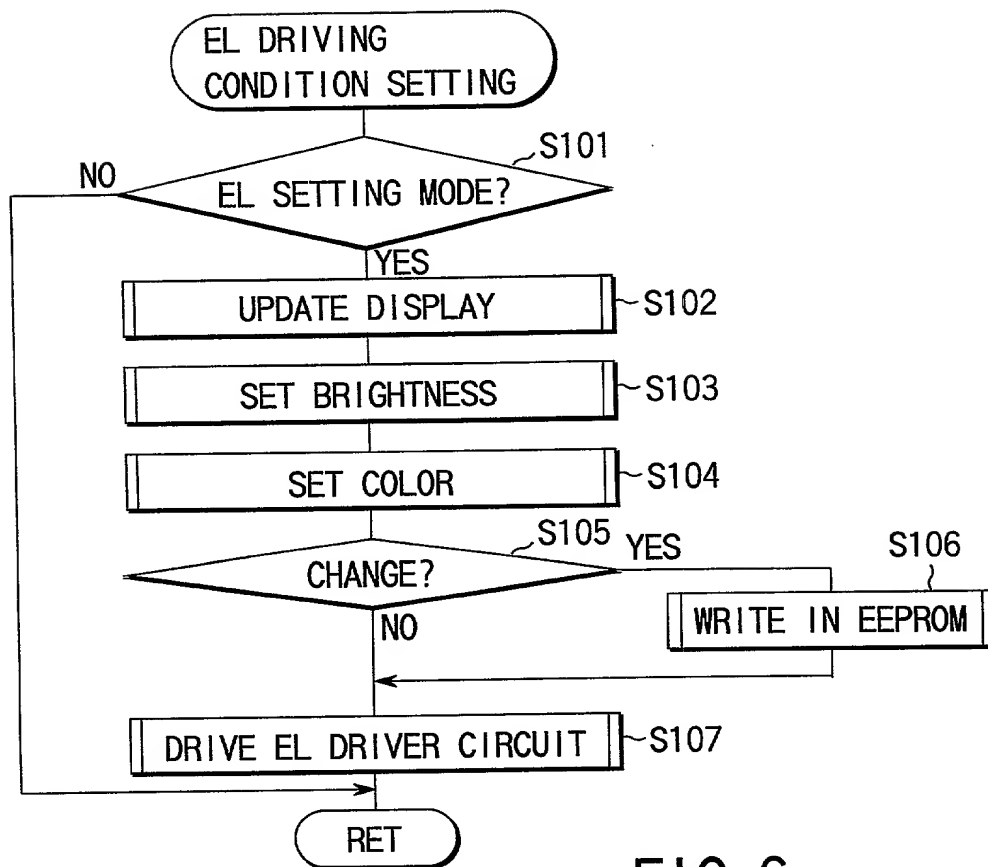


FIG. 6

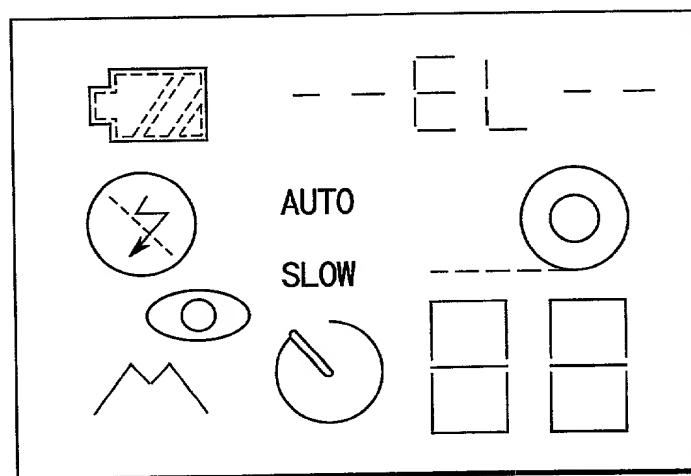


FIG. 7

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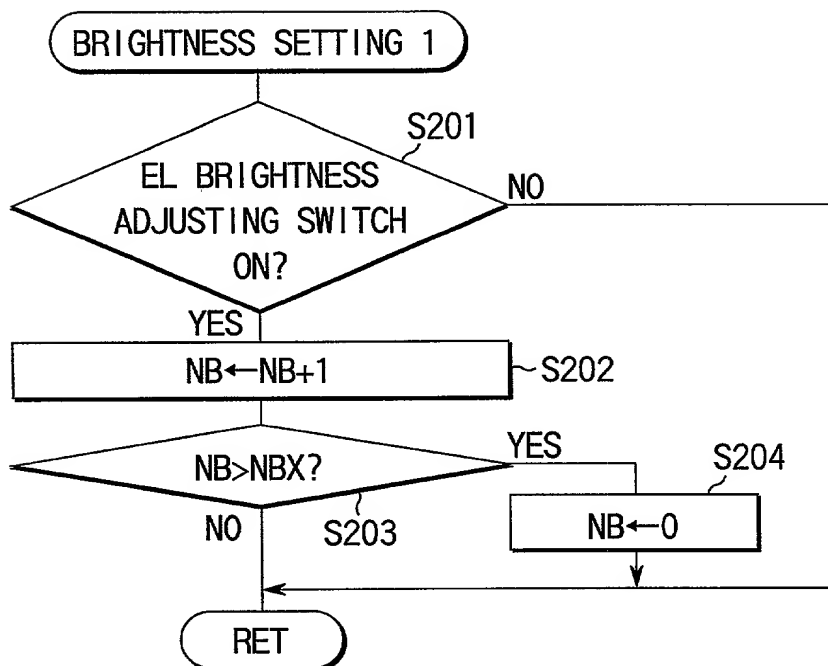


FIG. 8

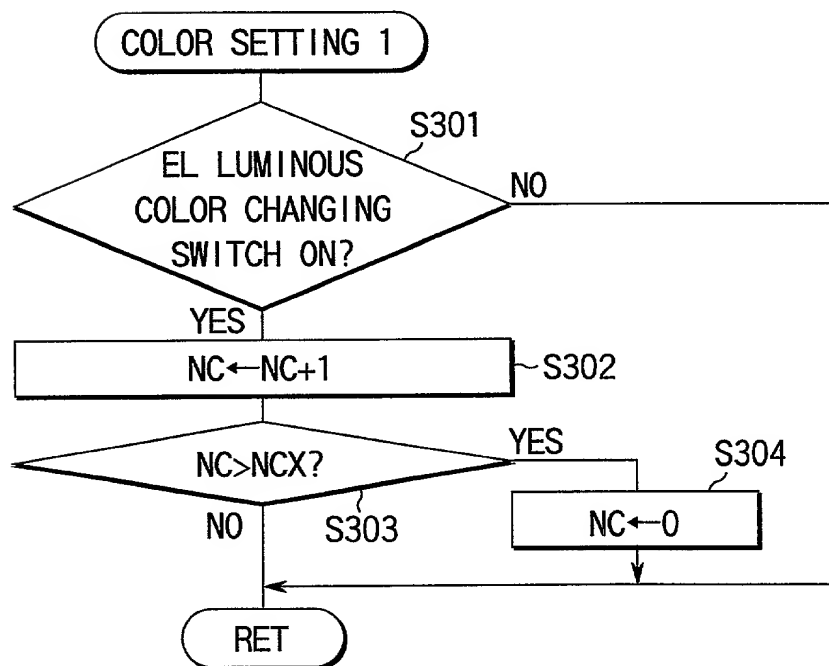


FIG. 9

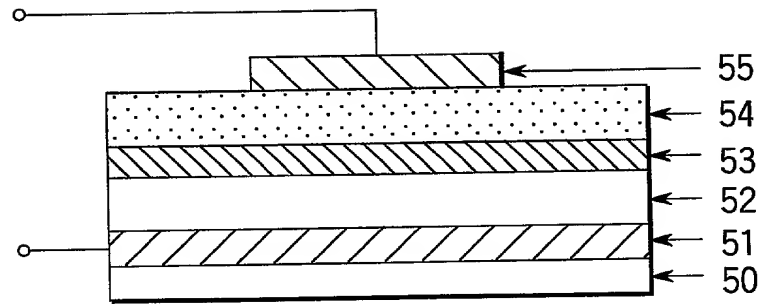


FIG. 10A

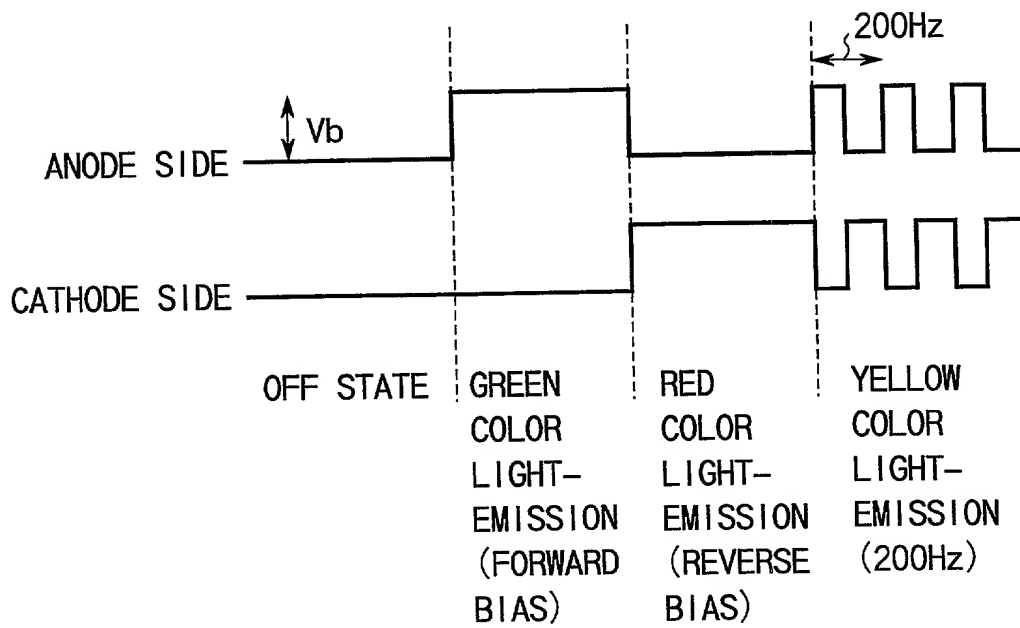


FIG. 10B

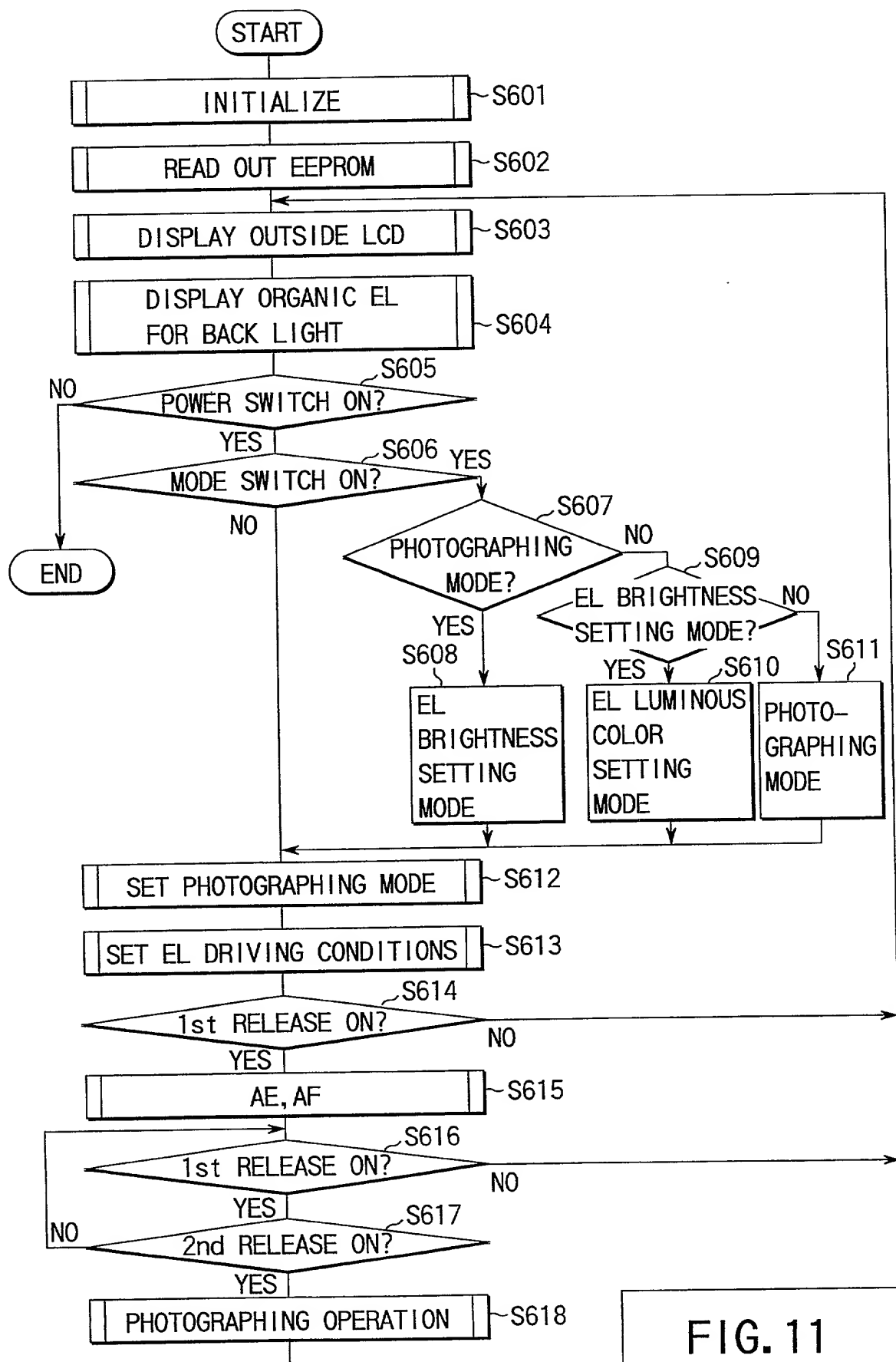
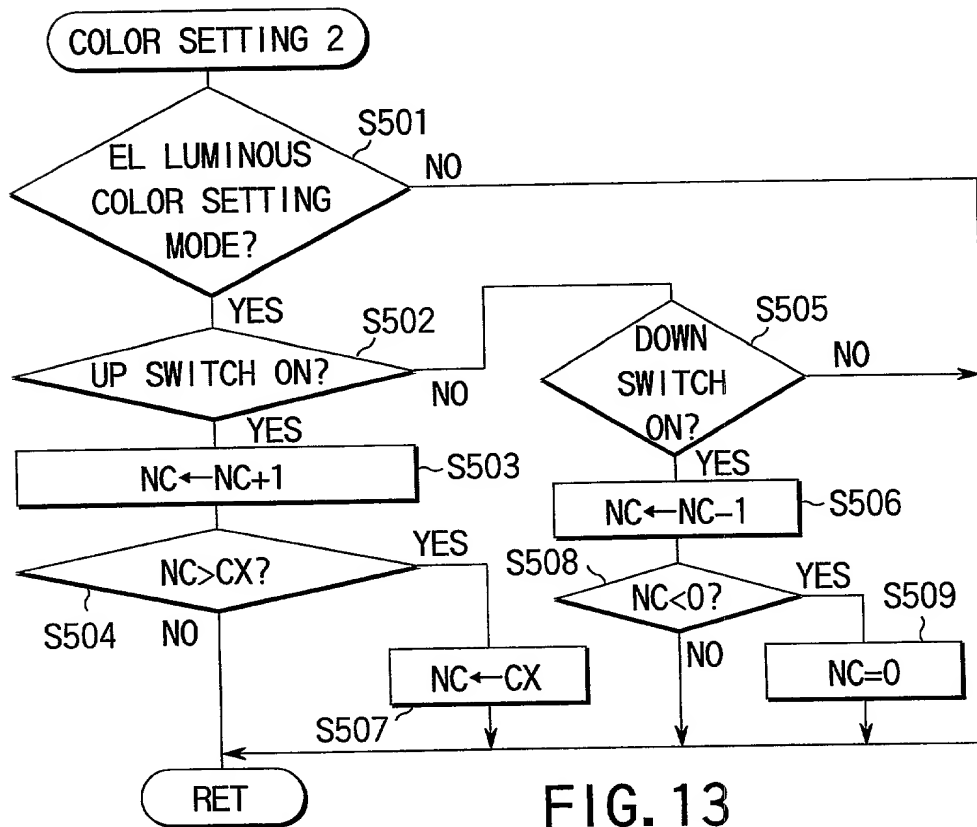
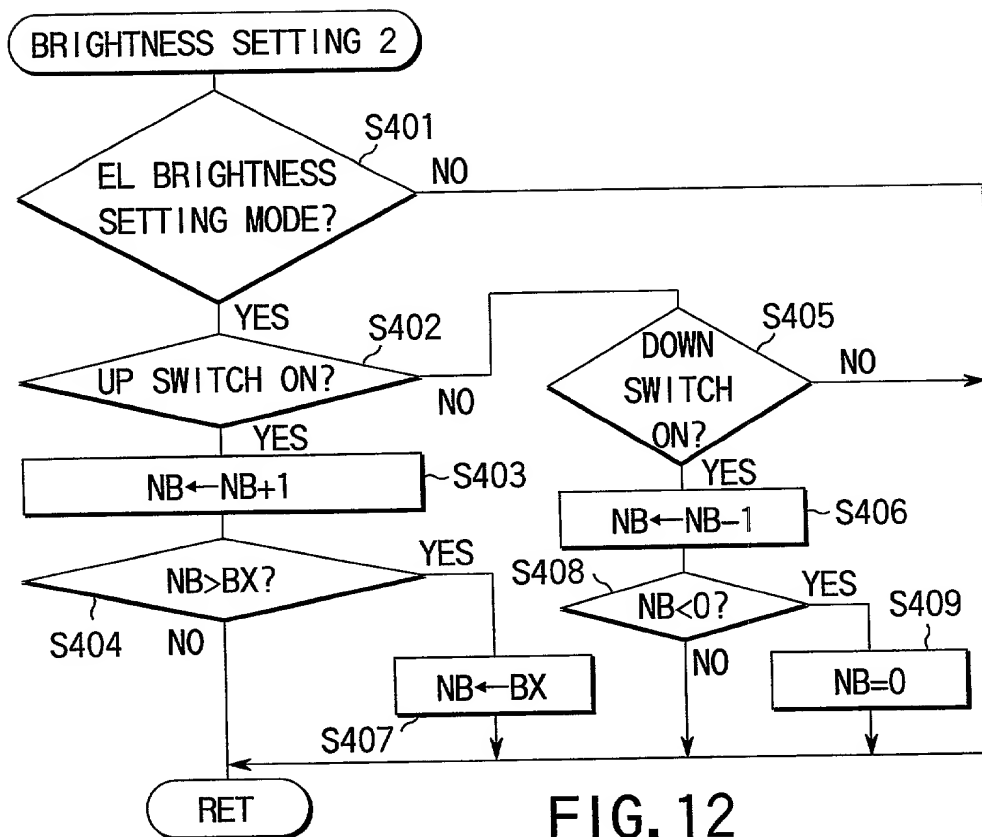
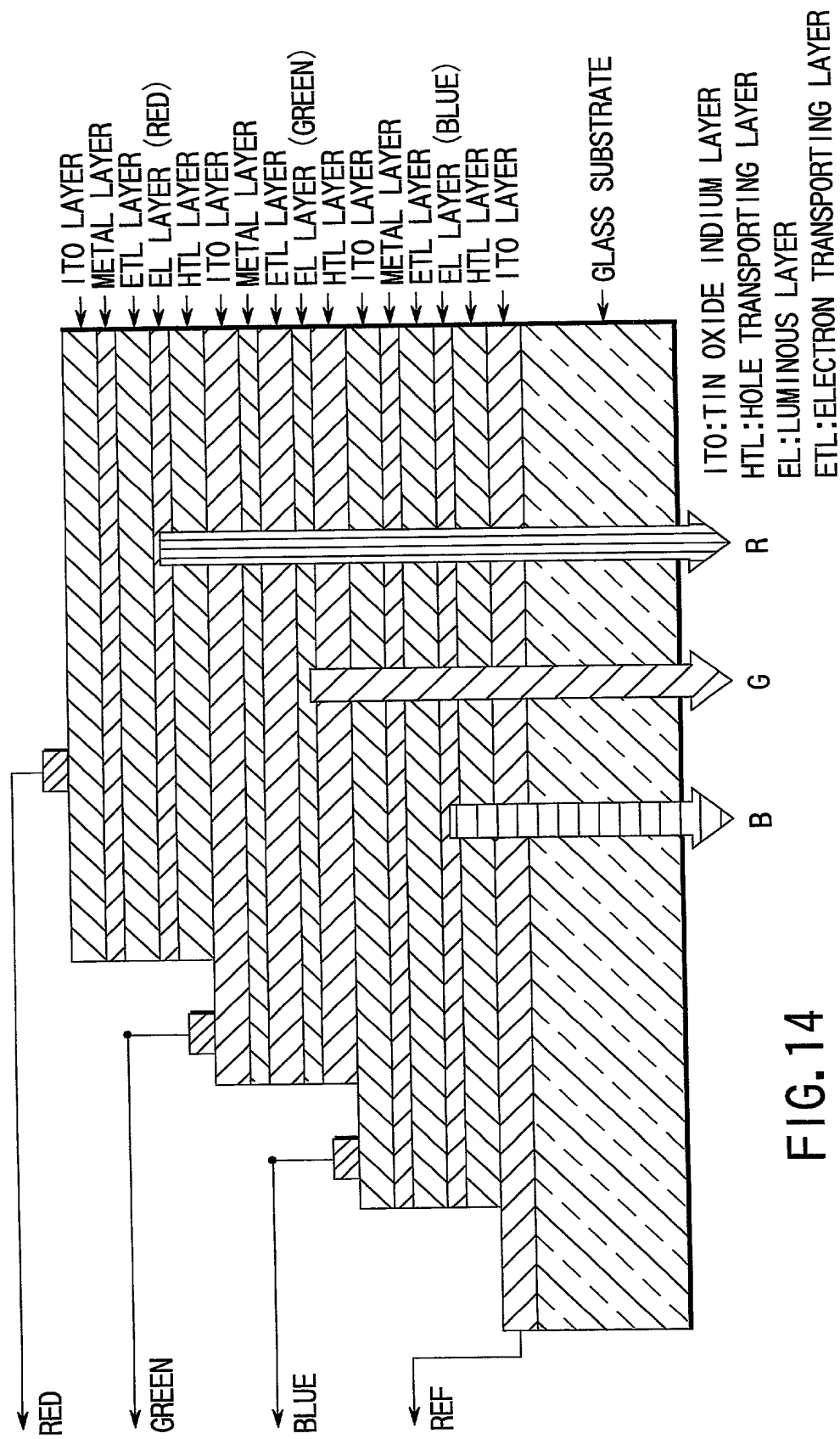


FIG. 11





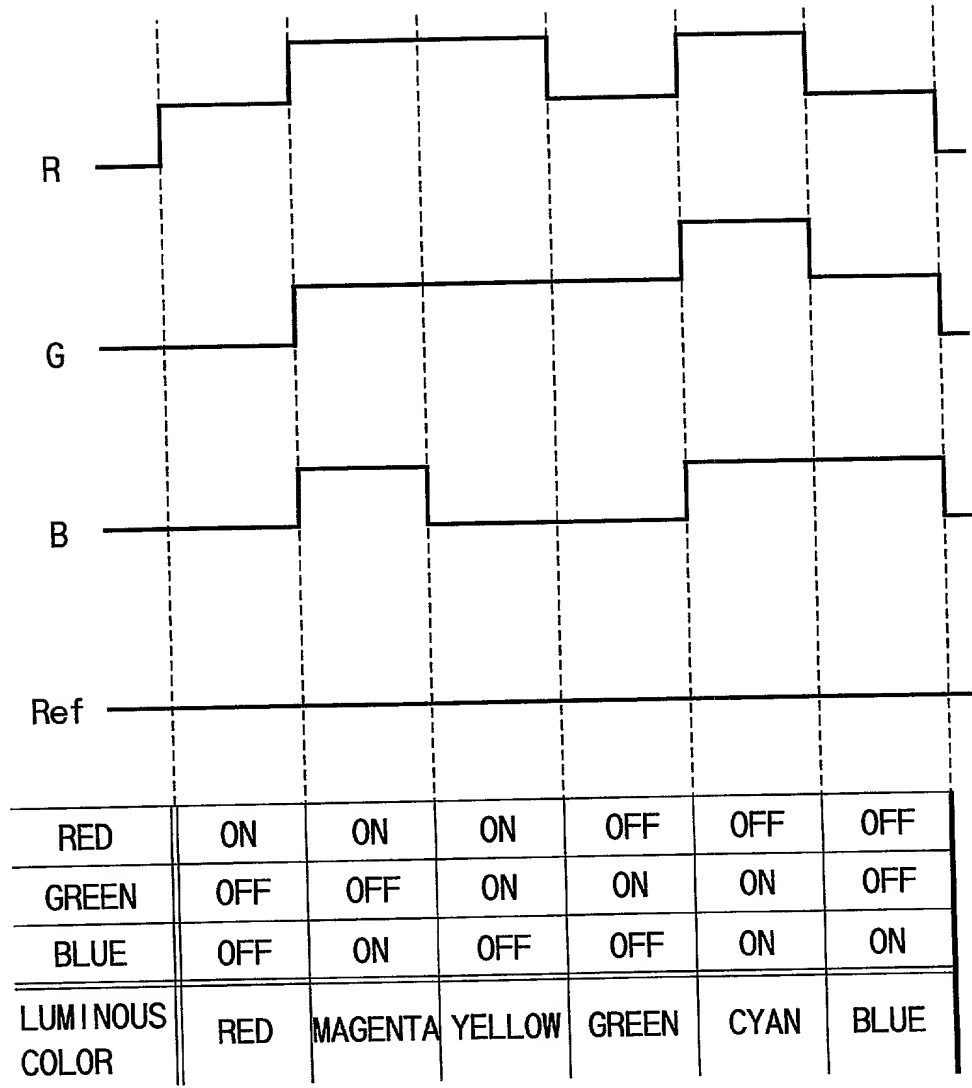


FIG. 15

Declaration Power of Attorney For Patent Application

特許出願宣言書及び委任状 Japanese Language Declaration 日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の横に記載された通りです。

My residence, post office address and citizenship are as stated below next to my name,

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

有機EL素子を用いたカメラの表示装置

DISPLAY DEVICE FOR CAMERA USING ORGANIC EL ELEMENT

上記発明の明細書（下記の欄で×印がついていない場合は、本書に添付）は、

The specification of which is attached hereto unless the following box is checked:

☐ _____月 _____日に

提出され米国出願番号または特許協定条約

☐ was filed on _____ as United States Application Number or PCT international Application Number

国際出願番号を _____ とし、
（該当する場合） _____ 月 _____ 日に訂正されました。

_____ and was amended on _____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

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I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56

Japanese Language Declaration

(日本語宣言書)

私は、合衆国法典第35編第119条(a)-(d)項又は第365条(b)に基づき下記の、米国以外の国の少なくとも一カ国を指定している特許協力条約365(a)項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

I hereby claim foreign priority under Title 35, United States Code, Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)
外国での先行出願

Priority Not Claimed
優先権の主張なし

10-357641
(Number)
(番号)

JAPAN

(Country)
(国名)

16/12/1998

(Day/Month/Year Filed)
(出願年月日)

☐☐☐☐☐

私は、第35編米国法典119条(e)項に基いて下記の米国特許出願規定に記載された権利をここに主張いたします。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Application No.)
(出願番号)

(Filing Date)
(出願日)

私は、下記の米国法典第35編120条に基いて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約365条(c)に基づき権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第35編112条第1項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第37編1条56項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) or 365(c) of any PCT international application designating the United States, listed below and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT Information application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which become available between the filing date of the prior application and the national or PCT international filing date of application:

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

私は、私自身の知識に基づいて本宣言書で私が行う表明が真実であり、かつ私の入手した情報と私の信じていることに基づき表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行えば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration

(日本語宣言書)

委任状: 私は、下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。
(弁理士、または代理人の氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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(第二以降の共同発明者に対しても同様に記載し、署名をすること。)

(Supply similar information and signature for second and subsequent joint inventors.)

Japanese Language Declaration

(日本語宣言書)

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国 籍	Citizenship
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OCT 1999